DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) and

THE DOW CHEMICAL COMPANY (Dow)

TRI-CITIES DIOXIN COMMUNITY MEETING

November 8, 2006

6:30 - 9:00 p.m.

Horizons Center, 6200 State Street, Saginaw

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CHUCK NELSON: My name is Chuck Nelson. I'm the facilitator for tonight's session. In my day job, I work at Michigan State University in the Department of Community, Agriculture, Recreation and Resource Studies. I'm pleased to be here with you tonight. This is one of the quarterly town hall meetings regarding dioxin -- historic dioxin contamination on the Tittabawassee and Saginaw Rivers.

I will call to your attention the agenda that Cheryl Howe is distributing on the back table. If you will walk through the agenda ever so briefly with me, you'll notice that from 6:30 to 8:30 we have presentations and relatively limited time for questions. This is a fairly full meeting tonight. We have lots of informational topics, folks bringing new things that are very pertinent to what we're doing. We do have a half hour at the end for you to go in depth and ask questions about any of the previous presentations. I will do my utmost to stay on the schedule so we do get through all the presentations and still allow time at the end for questions.

I would also call to your attention, at the end of the discussion of the agenda tonight, it notes the next meetings in this process. The meetings for the

year 2007 are all noted there. Please get those on your calendars so nothing is a surprise and that you will be back and join us and work with us as we continue this process. Again, just noting the next meeting after this one will be February the 8th, 2007, then May 17th, August 9 and November 8. Again these are in your agenda.

I would also call to your attention the ground rules for tonight's meeting. We will do our best to stay on time. We need folks to be respectful, straight forward, honest. We will do our utmost to give everybody chances to ask questions but I will do my best to move things along so that everybody gets their chance. I would also note that the folks from Dow, their contractors, the folks from DEQ, the Michigan Department of Community Health and others will be here for a half hour following the meeting from 9:00 to 9:30 for you to follow up, do one on one, ask additional questions, so please take advantage of this. At every meeting, these folks have done their absolute best to be here a half hour early from 6:00 to 6:30 and to be here from 9:00 to 9:30, so it really does provide you excellent access if you wanted to go in depth on a question or a comment.

I would also call to your attention the web sites

located at the bottom of the page. Cheryl has noted that there are a couple of larger handouts that she has a limited number of copies in the back that you can download from the web, but if they look a little bit too substantial for you to print out, she has copies of these. In particular, these are things regarding the notice of intent regarding the Natural Resource Damage Assessment and there are a couple of handouts available about Sediment Trap Demonstration Project. So Cheryl has those in the back. She has 25 of each. If you need a copy of those, please, see Cheryl. You're welcome to do it now. The presenters will be talking about these things in some depth.

So at this time if we could have John Musser and Jim Sygo introduce the folks from Dow and DEQ respectively, we'll move on.

JIM SYGO: It's not only DEQ but it's other State agencies as well. Why don't you all stand up if you're with the State agency so I can see you, and then as I call your name, you can sit down, and we'll try to do it that way. In the front row, we have Al Taylor with DEQ. He's a geologist on the project. Next to him is Mr. Robert Reichel who's with the Trustees, representing the Trustees tonight. George Bruchmann, the Division Chief of Waste and Hazardous

Materials. Steve Buda who's the Section Chief of the Hazardous Waste Section. Deb MacKenzie-Taylor our toxicologist. Art Ostaszewski, one of our workers on the project as well. Linda Dykema with the Michigan Department of Community Health. Kory Groetsch with the Michigan Department of Community Health. Terry Walkington is our District Supervisor for Waste and Hazardous Materials Division. Frank Ruswick is Directors Policy Coordinator with the Department of Environmental Quality. Cheryl Howe is in the back of the room. She's the engineer on this project, and Trisha Peters is also one of our inspectors out of our district office here in Bay City and -- Saginaw Bay district office. Is that everybody? I don't see anyone else standing. Okay. John, I'll turn it over to you.

JOHN MUSSER: Thank you, Jim. Nice to see everyone here this evening. Thanks for coming out. Can I get the same kind of response from the Dow folks so I know who all is here? Very good. On the front end here, we have Tom Long with the Sapphire Group, Risk Assessment and Toxicology, contractor to Dow. Next to him is Jim Collins. Jim is our Director for our Epidemiology Department at Dow. Next row is Bob Budinsky who does Toxicology and Risk Assessment for

Dow. Next is Mike Carson. Mike is our Medical Director for the area. Next to him is Jim Braithwaite, and Jim is with Ann Arbor Technical Services. Next to him is Peter Simon with ATS as well. Gary Dyke from CH2M Hill. David Gustafson, Regulatory Affairs, Dow Chemical. Peter Wright, legal counsel for Dow. Joe Heimbuch, consultant for Dow, project management, and also Jack Clough, consultant to Dow on Public Affairs and Outreach. I think that's everybody -- oh, the boss, excuse me. Ladies first, Jennifer Heronema from Dow Public Affairs. Terry McNeill, Public Affairs Director for Michigan Operations, and my boss Greg Cochran, head of the Dioxin Initiative. Okay. Did I miss anybody else? Very well. Thank you.

I think I can start this. It's my pleasure to introduce Peter Simon, and Peter will give you an update on the work that's been going on in the Upper Tittabawassee River. This is the Geomorph approach that we've talked about the last couple of meetings, and his colleague Jim Braithwaite will be assisting him on the latter part of the presentation, so if you will, Peter.

PETER SIMON: Good evening. My name is Peter Simon. I'm the project manager for Ann Arbor Technical Services on the Geomorph site investigation

for the Tittabawassee River and Upper Saginaw River projects. To my right is an associate of my mine, Jim Braithwaite, professional engineer and esteemed colleague. We're going to have kind of a joint presentation tonight. I'm going to give an overview of what we have found to date and some of the activities that we have completed as well as those that have been planned and proposed for the remainder of this year, 2007 and 2008. Jim is going to give an overview of some of the pilot study activities that we are currently evaluating and we're planning for implementation, hopefully next year.

It's hard to believe it's been nearly six months ago I stood up here and gave an overview of what it is that we had planned for the Upper Tittabawassee River project in terms of a Geomorph site characterization. There's a lot of people, a lot of familiar faces here. We worked really hard over the last six months and made some tremendous progress, and I'm going to give you a highlight of not only that progress but where we stand today. Everyone involved has spent a lot of time, a lot of effort, and I think you'll see from where we are today we've made a lot of progress.

The objectives of tonight -- I'm going to give an

overview of the Tittabawassee project, where it stands in terms of work plans, investigation plans and give an overview of the site characterization. In August of this year, we initiated a detailed Geomorph site characterization and I want to give you an overview, a status of that. We just finished our eighth field stage. Nearly 6,000 man hours have been logged in the field by our field crews. In addition to that, we're going to identify some areas that we're targeting, some pilot activities or pilot projects for next year, and the overall schedule for that.

Project update, we stood here -- I stood here in April of last year -- or April of this year and presented a very aggressive, as a lot of people indicated to us, plan for this year, and there's a lot of hard work on behalf of DEQ and U.S. EPA and ATS and Dow to really make a lot of progress, and we developed a very comprehensive site investigation workplan during the month of April and May of last year, submitted that workplan to the agencies, received approval on a positive scale basis in mid July, and 14 days later we're in the field beginning to implement that plan.

Since that time, we've completed the initial characterization of the upper six and a half miles.

It's a pretty major milestone given we did it in just over 90 days in terms of the initial characterization. We've initiated some pilot project activities. We've met with the Agencies and we have some ideas on things that we want to evaluate for some areas that we've identified during the initial site characterization. In addition to that, one of the activities that we took upon or was asked of us was to develop a remedial investigation workplan for the Tittabawassee River as well as the Upper Saginaw River. That incorporates 22 miles of the Tittabawassee River as well as about 6 miles of the Upper Saginaw River. The deadline for that workplan is December 1st, 2006. So it's not very far away.

We've scheduled a series of collaborative meetings with the Agencies to work through and with a goal of being on December 21st having a generally consensus document on how we're going to proceed with the investigation activities for the remainder of the Tittabawassee River as well as the Saginaw River. Things that we can't come to absolute resolution on we're going to have placeholders on and put a time frame and commitment to get those things resolved during the months of December and January.

In the last 90 days, I had mentioned our field

crews mobilized to the site about August 1st of this year. During that time frame, we've been running three crews, typically two to three people per crew. We're working a ten days on, four days off schedule. Some of the people are located -- their homes are quite far away, so it works out logistically the best for us, but nonetheless, it's a level of commitment from our field crews to be in the field and away from home, so that's something that shouldn't go unrecognized.

During that time frame, we've collected over 2,600 samples from nearly 600 in-channel and over-bank locations, again 2,600 samples in 90 days. Of those 2,600, 2,200 of those have been analyzed for dioxins and furans. You sit there and say, okay, well, 2,200 out of 2,600, where is the other 400. Those 400 are still underway. They're in progress. Our field crews just demobilized today at home. So part of the investigation activities are still underway. That may seem somewhat unremarkable maybe for some of you, but I can tell you, having been doing this for a long time, that's a task that nobody has completed in the history of man, 2,200 samples in 90 days for dioxins and furans. We basically consumed the analytic capacity in the Midwest for dioxins and furans.

And one of the things that helped us get there was the development of an optimized or streamlined process or analytic process to analyze dioxins and furans. What that allowed us to do is take the average analytic turnaround time from three to four weeks, which historically has been the problem, which when you're doing your real time kind of investigation, it doesn't -- it's not very conducive to being able to do that. Average turnaround time is about 48 hours. That's from the time the samples were collected to the time we had fully certified, fully validated data. 48 hours later we had an idea of what the concentrations were at that particular location.

The power of that allows us to move through the investigation process and share that information with the people that are on the project team and so forth on a near real time basis. During that time frame, again, we've logged more than 6,000 man hours. We've got one more field stage, maybe two. We've got some secondary characterization kind of things that we'll be working on the remainder of this month.

Where was the work done? To give it some perspective, the area to the top left of your screen is the confluence of the Chippewa and Tittabawassee River. This figure identifies about six and a half

river miles. For those of you that may be familiar with the Geomorph process, it really is -- it's a layer based analysis. We really need to understand the river dynamics. We need to understand the river characteristics. It's about understanding the nature of the deposition and erosion in various areas. So one of the ways that we do that is break down the river into smaller elements because each of those elements have different flow characteristics.

This particular section of the river was broken down into 15 river reaches. It seems fairly complicated for what looks to be a relatively straight river. Well, it's nothing but a complicated river. This is one of the most complicated river systems we've worked on. It has base flow characteristics in the 1,000 to 2,000 cubic feet per second range all the way up to high flow conditions, which many of you are familiar with. That presents some very difficult problems from fate and transport and from a nature and extent investigation.

For reference purposes, the Gordonville Road Bridge and Smith's Crossing are bracketed basically Reach L, which is one of the designations we come up with. When we break the river down into individual reaches, we do that based on the flow changes. So if

you have a bridge or if you have a significant tributary that enters the river, anything that would potentially modify the flow through that part of the river, would necessitate the designation of a new reach. So it's a term that we use and you'll become more familiar as we move through the rest of the project.

Understand the river landscape over time is kind of a foundation element for Geomorph. What we're looking for is what has happened during the period of interest. We've been working on this project for six months and we're trying to unfold or peel back the layers of an onion going back 100 years or just over 100 years at least as it relates to the period of interest. Under normal flow conditions or low flow conditions, you see the river behaves and stays within the channel banks. This normal process develops areas of the deposition. Those areas in here are highlighted in blue or point to point bars, commonly shown in blue.

In addition to that, there are erosion areas. Why is that important? Well, under normal flow conditions, materials that enter the top or the upstream portion of the river will under normal conditions find their way and deposit. They will

deposit sediment there based on particle size and flow velocities and so forth. So understanding where those deposition areas are is a fundamental piece of Geomorph. In addition to that, typically on the opposing side of those inside meandering bends are erosion areas. Those areas on this figure are identified in red.

Now this simplified overview, perspective or figure really does a pretty good job identifying, you know, the classic or the typical landscape we're seeing in the native setting of the Upper Tittabawassee River. We have an upland area. We have terrace development, and we really have -- on this figure, it's referred to as a floodplain and a lot of people do refer to it as a floodplain, but from our perspective, it's really more of a floodway. During high flow conditions, you see bank to bank kinds of flow and it's moving through there pretty good. So this river behaves differently at different times of the year based on the flows, and it's very important to understand how that relates to the erosion and deposition characteristics because it's not uniform.

The other element that is important in understanding this and beginning to peel back and understand the layers of the onion so to speak are

manmade influences. If you put a bridge, if you put a tributary, if somebody puts a dock or a pier out into the river, it's going to change the flow characteristics moving through that part of the river. That could potentially convert erosion areas into deposition areas and vice versa. Well, that becomes important, especially if you're doing or trying to delineate or identify where historic containments are present.

This is kind of an overview of a figure that we presented I think in August of this year. What you see here is a series of transects, and transects are identified based on changes in Geomorphic features. You'll see there's that blue line across the top is a tributary. Well, there are Geomorphic features upstream from that and downstream from that. So anytime you have a substantial change in a Geomorphic cross section or a view across the river, we insert another transect, because we need to understand what the deposition and erosion characteristics are in each of those settings.

Now there's an area right in the center here. This is a reach designation or a reach break. Well, those reach breaks are typically located just downstream or just approximate to major flow changes.

This tributary is one of those such flow changes. It's a substantial flow change. Now when you see this figure, you'll see a lot of different colors. You'll see some dots. Those are the sampling locations, and we have some insight as to the relative concentration associated with those. In addition to that, we also see a number of polygons or shapes. Well, what are those things? Well, we have a number of surfaces. There's about ten or twelve different types of Geomorphic features or surfaces that we've identified, anything from natural levies adjacent to the river, low terraces, intermediate terraces, a concept that's going to become important as we continue to move through the investigation, the concept of a historic natural levy. Something has caused the river to change where it historically was 100 years ago or 200 years ago. In addition to that, there are upland areas and wetland areas. Each of those things and each of those features have different erosion and deposition characteristics.

The good news is that the Geomorph process is working. It is identifying the deposition areas. It is identifying the erosion areas, and it is doing it quite efficiently, and I'm going to present a couple of additional figures that explain what it is -- what

we're finding in the upper six and a half miles.

I talked about a cross section or a slice of a pie. This is what I'll refer to as a typical river cross section, and I spoke a little bit about -- this area right here is in a section where the Tittabawassee River is, and immediately adjacent to that, we have a natural leavy. Natural levies are important because that is a primary deposition area. Immediately adjacent to that, you'll see there's a low terrace, adjacent to that the historic natural leavy, followed by a wetland, the intermediate terrace, and upper high terrace.

Okay. Well, what does that all mean? Well, what that all means is during flow conditions, whether it be low, moderate or high flow, the deposition characteristics of this area will change. So under low flow conditions or under normal flow conditions, the primary deposition area is going to be in the natural levies. We have seen that. We did borings in these areas that extended down to 15 feet. We intercepted or what we refer to as native clay. It's about 15 and a half feet below grade. We know that is during the time of the last glacier period. We have about 15 feet of vertical deposition there. Immediately adjacent to the low terrace, well, there's

not very much sediment deposition going on, a couple of feet, and then you get into the historic natural leavy. We've got a little bit, but you can see just based on the little color changes it's not very much, and then as you move into the wetlands, the wetlands are acting and behaving like you would expect. They are depositing material, sediments, soils. The soil development process is actively underway and it is a very stable environment from a deposition characteristic or standpoint.

Moving up and out of the floodplain, in this area over here, identified here as scarp or the upper high terrace, the deposition in those areas, as you move into the intermediate terrace and upper high terrace, the thickness of the sediment depositions in these areas is very limited, and as a result, there's not much in the way of contamination.

So looking at this cross section or this kind of perspective view of the variety of features that are present in the upper six miles or six and a half miles, the area that is the primary or focused deposition area under most flow conditions is the natural leavy. We've got about 10 to 12 or 10 to 15 feet of vertical deposition, and in those areas, that's where we're finding the bulk or the highest

concentrations in the upper six and a half miles.

Now I need to caution you because the investigation is still underway. We have secondary and stepouts that are underway for the rest of this month, and we'll be reviewing that with the Agencies, such that our goal is to be at the end of November but definitely by the end of the year to have a general agreement on, yes, we're good, we've adequately characterized the upper six and a half miles, and it may extend us to 650 samples or maybe 700 samples, and that's something we're going to be working on collectively.

At this point I'm going to transition this over to Jim Braithwaite. Again I think the important thing to identify here is we have identified some areas that we're going to be focusing some pilot projects on over the course of the next six to twelve months, and Jim is going to talk to you a little bit more in detail about the nature of those pilot studies that we have intended for the next seven months.

JIM BRAITHWAITE: Thank you, Peter. Good evening. As Peter has mentioned, we've got quite a bit of data back on the river at this point. We're still collecting data. We're still evaluating the data, but one of the things that we are seeing is a

rather typical profile, and Peter touched on it a bit. We have here adjacent to the river -- here's the river. Adjacent to the river, we have what we're calling the natural levy, and we believe that this levy has been built in the post industrial age. We are finding as we go down to depth -- and this boring here is 15 feet deep, horizontally there from 20 to 40 to 50 feet apart, just to give you a feel for the scale, what we're seeing in these borings that are closest to the river is we're finding a layer of burnt wood at the base, which tells us that that burnt wood was placed there during one of the great fires that swept across the State after the lumbering period or during the lumbering period. So we've got a good timeline to start with at the base.

So we know where the industrial age started, and then we don't see that sort of formation in the historic natural leavy, and we believe that this was the natural leavy that existed prior to the dams going in upstream on the Tittabawassee River. There's five dams that were put in, in 1925, for the purpose of both generating power and for the purpose of reducing flooding in Midland and Saginaw. Well, with the introduction of those dams and the storage behind those dams, the river didn't need as much channel to

carry the water, and so, therefore, it started building a new leavy on top of what was river bottom at the time.

So we have a good time profile we believe. We're seeing this quite frequently, and the bulk of the contamination that we're finding along the river, the good news is it's in a very narrow strip along the river, and as you go away from the river, the concentrations drop off quite dramatically, and the profile is such that in the historic levy we have two to three feet of rather low levels of contamination and then the intermediate terrace is right below that, and on the wetlands, we have -- as materials have deposited out in this small flow regime, we're finding a little more contamination, but then as you go back up away from the river into the floodplain, we're finding very, very little contamination. So that's the good news is that the bulk of the floodplain doesn't have significant amounts of contamination, and where we do find it back up in the upper terraces, it's only a few inches thick.

So we focused, since we started finding this pattern over and over again this summer, on rather elevated concentrations, and the red here represents greater than 15,000 parts per trillion, and we've got

about a half dozen to a dozen of those places buried at depth. Most of them are buried below the ground surface. They're not at risk at erosion right now. This cross section is typically drawn such that this is a historical deposition place. It is still being deposited on top of with clean soils and it's not at risk of erosion, and so our goal is to find out what we need to do to protect this area or to address this area so that if the river does change and if some other manmade feature comes in and changes this inside bend, which is depositional, to an outside bend, which is erosional, that we make sure that this material doesn't become eroded and transported downstream.

So we've been looking at a variety of alternatives to manage those kinds of places where we have those higher concentrations, and as those of you who live here know, that this is a very flashy river. There are periods where you can hardly get a boat down this river. We took a trip down in April and there were many places where it was 6 or 12 inches deep. There are other times when the big storms come where it's 15, 20 feet deep and it's raging with whitecaps from scarp to scarp. So we have a low flow condition that we need to deal with and we have a high flow condition that we need to deal with, and those kinds

of conditions present different kinds of challenges for control.

One of the things we have to be sure of as we go in to address these areas is we don't create more damage downstream than we're fixing upstream, and there are places on the river where we've seen armoring to protect one bank and not too much further down the river serious erosion being caused by the armoring that's being done to protect the eroding bank, for instance. So we need to be very careful on what we decide to do with this very high energy system. Right now we have the best modelers in the country I think doing dynamic modeling on these portions of the river to give us a feel for what the velocities are, how the streamlines work. So that as we come up with these different management controls, we can numerically model them on the computer before we try to do something in the field.

The other issue that we're factoring into the evaluation is that this area has come a long way ecologically from the devastation of the clear cutting and the forest fires of the late 1800's. We've got a dozen pairs of nesting bald eagles. We've got nesting gray horned owls. It's basically a very pristine ecological setting, and the wildlife people are

telling us, whatever you do to take care of the dioxins, don't mess with our wildlife. So we have to factor that into our evaluations, too, how we try to manage this setting. So we've embarked upon these pilot projects to help us understand what we can do to reasonably control these elevated concentrations without causing damage downstream and without adversely affecting the ecological balance of the area.

Under low flow conditions, we basically need to work with the water line, which is this kind of erosion right here. We're seeing a lot of erosion in the lower 12 inches, which we think may be related to the daily releases from the Sanford Dam, and so we're investigating that, and we're seeing what we can do to protect this lower part of the banks so that we're not undercutting the cutbanks in areas where the dioxins and furans have been deposited, and so we think that there's a considerable amount of erosion that goes on during regular low flow and during very minor storms, and so we know the annual storm that comes through this area is enough to mobilize furans from the embankments and move it downstream onto floodplains. So we have to deal with the annual flood and then we have to deal with the 100 year flood.

This is an example of what some people are doing along the water line, rip-rap. It requires a lot of maintenance. It doesn't do anything for the ecology and it's not very attractive. One of the things that we're thinking about, we talked about with DEQ, is using innovative techniques called cross veins, where we start out with putting boulders in below the original bottom of the stream in the center and gradually increase the elevation of the boulders towards the outside of the stream on both sides so that it looks something like this in cross section and something like this if you're looking up river. Here's an example in a stream where the water is flowing down through the center, and what this does is it diverts the high energy water from the shoreline, directs it towards the center of the river, and we create a pool here, which is good fish habitat, and we use natural materials so that it's not aesthetically unappealing.

During high flow conditions, the water doesn't care where the river channel is and it basically goes straight down the floodway, and it will erode in this area here as it comes out of the stream. It will erode a particle and it will drop that particle here. Depending on the size of the particle, it can take it

all the way out to Saginaw Bay. Heavier particles settle out rather quickly, but we need to have different kinds of controls to deal with high flow conditions than we do with low flow conditions, and there are a number of technologies we're evaluating right now, including armoring with rip-rap, including excavation, including various kinds of velocity controls. If we go with this kind of control, again, it's not aesthetic and pleasing. The animals that live in these rocks are subject to predation by bald eagles and owls and it does nothing for the -- what's the bird -- king fisher. Anything that we do will affect the king fisher habitat, which happens to be limited on this river. The king fisher habitat is one of the most limited habitats that we have.

One of the alternatives that we're looking at in order to deal with higher flow conditions is to do excavation of the elevated concentrations in the natural levy and dispose of that, and that, thereby, increases the cross sectional area of the river, which reduces the velocities, which improves erosion conditions both at the area of the activity and then also downstream. Unfortunately, we have a lot of areas where we have high concentrations in the natural levy closest to the stream without a lot of volume.

It doesn't take a lot of volume to pull that out of there and to move it to someplace safe, and in doing that, we can excavate back into the historic natural levy, which is clean and provides refreshed cutbanks. The king fishers rely on the river to undercut the banks, create a vertical bank so that predators can't get at their nests. So by taking out the contaminated levy, we can expose the historic levy and get triple bang for our buck. So we're out of time, Peter, go ahead and finish it up. Thank you.

PETER SIMON: Where do we stand in terms of the pilot project process? Currently, the plan development is underway. The goal is to be able to have a consensus pilot project, consensus being between Dow, ATS and MDEQ. One of the important elements in the overall pilot project process is the permitting process. It's not something that we can underestimate. It's a time consuming process. We are working collectively with the Agencies to help us streamline that process, but roughly, it's about a six-month process. So we've initiated those discussions on the permitting aspects of this.

One of the elements that we anticipate using is public technical information meetings. So as we pull together plans for various areas, the desire is to sit

down with the public and review those plans, get feedback, get understanding of whether aesthetically they like those things, with the goal of having the approval in the spring time such that we can complete -- or implement and complete those pilot studies or pilot projects during the 2007 construction season.

Overall project schedule, November 30th, our goal is to have the complete Geomorph site characterization activities. That may go into December but we're pretty confident. We've initiated some secondary sampling already in anticipation of having to do that and we're going to be reviewing that next week with the Agencies. From that, we will have some probably additional samples and we'll complete those during the month of November. December 1st, complete the RIWP or the remedial investigation workplan for the Tittabawassee and Upper Saginaw River, so that's 22 miles of Tittabawassee and 6 miles of the Upper Saginaw River. That workplan will hopefully be a consensus document that we'll be submitting on December 1st.

February 1st, the analysis and summary of the activities that we initiated in December and August of this year. We refer to that as our site

characterization report. So the data, the analysis, some of the cross sections, we'll have more of those, the presentation of the information that we developed during the site -- initial site characterization and follow up or secondary site characterization will be included in that report on February 1st. May 1st, 2007, we'll be submitting the sampling and analysis plant for the Middle Tittabawassee River. That will tie back to the RIWP. The RIWP is kind of a working document that handles how activities will be handled on the river. This is intended to be a supplemental document that specifically talks about the characterization aspects of the Middle Tittabawassee River. That document is intended to be submitted on May 1st, 2007.

Summer 2007, implement the pilot projects on the Upper Tittabawassee River. Jim gave you a very brief overview. He could easily spend two and a half hours just talking about the variety of options that are available, and I took up a good chunk of his time. So I apologize for that, Jim, but we've got some -- given you a couple of examples. Please don't take that as the only set. There's a number of examples that we have in mind to evaluate for the various areas that will be considered for pilot project activities.

May 1st, 2008, submit the Lower Tittabawassee and Upper Saginaw River Geomorph sampling and analysis plan, again tying back to the RIWP which is the overarching document or master document that controls all activities. Middle Tittabawassee characterization sampling and analysis plan next spring. The following spring for the balance of the Tittabawassee River and the Upper Saginaw.

I do want to mention, I didn't, but the handouts were late. All of the information that we have here is in handouts. It's back at the table, and I apologize that they weren't here ahead of time, but at this point, I'd like to open it up for questions if we have time. I think we chewed up a lot of time.

CHUCK NELSON: Al, you had a couple of comments to make if you want to make those before questions.

AL TAYLOR: Sure. I'll be extremely brief. Uncharacteristically, I don't have a power point, good thing. Just a couple of things to reiterate some of the things that the Peter brought out, with respect to the remedial investigation workplans, which are being resubmitted on December 1st, Dow and DEQ have been working hard and cooperatively in a series of all day meetings and working to revise these RIWPs using the

process that we developed to get the Geomorph from a legal standpoint up and running this year.

We think that process is going fairly well and we're cautiously optimistic that we're going to have some good consensus based documents submitted on December 1st, but as Peter I think mentioned, there are a couple of issues that are probably going to extend beyond December 1st, in particular some of the human health risk assessment and ecological risk assessment issues. Those are pretty difficult issues and there are probably going to be a couple of placeholders in the RIWP that we're going to have to continue to work on through the winter and to make progress. Those are probably the most significant issues that we're going to be dealing with in this project.

I would like to indicate that the rate of progress on this project has increased dramatically over the last month or so, and we are doing I think quite well right now. We got going on this a little later than we had hoped but now we are making very good progress. We are keeping EPA informed of what we're doing so that they aren't surprised at the end of the process, but we need to make a continuous effort, both Dow and the DEQ, to keep them up to date

on what's going on as they are a major stakeholder in this as well.

Last thing I wanted to mention with regard to the Tittabawassee River RIWPs -- and I think most of the notice of deficiency items have been talked about in one way or the other -- one that we haven't talked about yet, and I don't think John is going to be talking about this aspect in the next part of the presentation, is that DEQ is very concerned about getting Priority 1 and Priority 2 sampling done as soon as possible. These are properties that flooded during the March of 2004 flooding event and had water actually up on their properties or residential properties typically, and it's a very high priority for the Department to make sure that we're not seeing, you know, very high concentrations up where people are living.

As part of the process, that, in fact, we worked out last week, during next year's field season, transects will be taken through a number of representative areas of the Tittabawassee River that encompass these Priority 1 and Priority 2 areas. We're not going to be hitting every single Priority 1 and Priority 2 properties. We're going to have a very good idea about what those concentrations are by the

end of next year, and this is a major notice of deficiency item that we are addressing in this manner. I think that's it for right now.

CHUCK NELSON: We have time for one or two questions. I want to keep things moving, but if someone has a burning question, now is the moment.

AUDIENCE MEMBER: Thank you. My name is Vicente Castellanos. I live at 1865 Hotchkiss Road, Freeland, Michigan. First of all, I'd like to thank you for your presentation, and I'd like to see this aggressive testing of the river. Having said that, I would like to know, first, is this on e-mail or on-line so that we can see your presentation in color rather than in black and white? Because there are some critical charts in this presentation.

JOHN MUSSER: We can make that happen.

PETER SIMON: Presently, it's not, but we can definitely make that available.

AUDIENCE MEMBER: Thank you. In the near future I hope?

AL TAYLOR: I think if we can have the guys submit them, we can put them up on the DEQ website and under this community, the November 8th community meeting heading in there.

AUDIENCE MEMBER: Okay. Thank you. Second

question I have is, you stated the permitting process is approximately six months. Which permitting is that?

AL TAYLOR: There's DEQ permitting through Land and Water Management Division. Obviously, we have a little bit of control over that. There's also Army Corps of Engineering permitting that needs to be done, which is --

AUDIENCE MEMBER: The reason why I ask this question now is because I see hazardous material -- we may be dealing with some hazardous material.

AL TAYLOR: It's not -- that's not part of the permitting that we need to address. We can address the hazardous waste issues, if there are hazardous waste issues, under the corrective action process. The issues that the permitting is -- really takes into account here is modifications to the river channel and the floodways. So that is a time consuming permitting process, and by law, Land and Water Management Division has to handle the permits in the order in which they are received. You can't bump a particular permit, unless it's for a really, really good reason, up to the head of the line. We got a little bit of control over that.

Army Corps of Engineers, they run their own

process, and that's something that's going to take its own time. We're certainly pretty close in contact with them.

AUDIENCE MEMBER: All right. Thank you.

CHUCK NELSON: I think we'll try to move on right now. These folks will be here. Remember, if you have questions, at 8:30, that's a good time to ask them. So next, John, can you talk about an update on Priority 2 interim response activities.

JOHN MUSSER: Actually, I've got two presentations to give, one is on the Priority 2 interim actions, an update on the activities there, and also to give you an update on the Midland soil sampling activity that's also underway as we speak. The Priority 2s, again just for characterization on what a Priority 2 is, those are the properties that were flooded but not as much as the Priority 1s, so these are the lesser flooded properties along the Tittabawassee River, and the process is basically the same process that we use with the Priority 1s, which is to make a mailing, which was sent out in March, make phone calls to follow up on those mailings to gain access agreements from the property owners, and then actually have our contractor, in this case AKT Peerless, make follow up property visits to visit with

the property owners and homeowners to identify which interim response activities might be most appropriate, and then issuing vouchers for that work to be done by contractors that were identified for the property owners.

And then the Priority 2 residents were then given the opportunity to call these contractors and have them come in and actually implement these interim actions. This is all voluntary. Homeowners had the choice to participate or not to participate, and the vendors have been active in following up on those requests to implement those activities and using those vouchers that are provided by AKT.

The home visits, these are the AKT Peerless visits, are nearing completion. As of yesterday, there were 532 eligible properties or Priority 2 parcels, and of those, we have 264 participants. The mitigation options scheduled to date, these are the interim actions that were discussed and agreed to with the property owners, 180 of those, and we have 148 of 180 completed at this time.

Here's just a list, a breakdown, of the various activities, the interim actions that were provided, and again a lot of these will be familiar to you from the Priority 1 activities, basically the same kind of

activity but to a lesser degree I would say than what we would have seen in the case of the Priority 1s because the Priority 1s were more flooded than these properties were.

I'm going to just skip to the next presentation and then I'll take questions on all of it when I'm through with the Midland, or we can do it now. Are there any questions on this particular Priority 2 interim action activity?

Moving to Midland, you recall that we had been talking on a number of occasions at these meetings about a bioavailability study, and the first phase of that bioavailability study was to investigate the soil properties of various types of soils in the Midland area that are thought to have some influence over the relative degree of bioavailability. So that's the number one reason for the soil sampling in Midland that's underway right now. The second opportunity here is to, while we're doing this, also look at what are the dioxin and furan content of those soil samples and in addition any other compounds, any other chemicals that may have historically been released from the Dow site there at Midland. So we're going to get a preliminary or a screening level look at not only the dioxins and furans but a list of several

hundred I think different compounds that will be analyzed for. Our expectation is that we aren't going to find a lot of additional chemicals but we'll leave the final judgment on that until we see what's in the samples. In addition, one of the things that the City of Midland asked for, and we worked this out with DEQ and the City, was to incorporate a means for keeping the sample results confidential to protect property owner interests.

The status of the study right now is that the sampling and analysis plan was developed jointly with MDEQ and Dow, and again, the City had some input in that as well. The procedures are in place to insure that anonymity of the property owners that are participating. We have gained access through access agreements for 145 sample locations. Actually, we got 136 of 145 where we've gotten an agreement, and that includes 697 total properties, and of those, 405 we've got access. This is more than enough sampling locations for us to be able to achieve the statistical results statistically valid results that we'd hoped to be able to get with this research. To date, this is as of yesterday again, we've completed 64 of the 145 stations and we've sampled 179 different properties. We're about 50 percent of the way complete.

This is just a grid. You'll recall you've probably seen this before. This is a grid of how the sampling locations are set up. The green boxes are locations that are available for sampling, and this next grid is just -- it's the same grid but this is what we've been able to complete to date. I might mention, too, that the first two boxes from the Dow site are boxes that will have samples taken for these other compounds of potential interest, and everything else, the sampling locations further out, each one of those lines are for Ds and Fs or dioxins and furans alone.

Now are there questions?

AUDIENCE MEMBER: John, will the analysis be provided to the DEQ or put out on the website of the chemicals that are analyzed for the sampling?

JOHN MUSSER: At some time, absolutely.

AUDIENCE MEMBER: Is the DEQ split sampling at all?

JOHN MUSSER: Al, do you want to speak to that?

AL TAYLOR: Yes. Split sampling is occurring. It's a little bit different than normally would be done because of the conditions that we've agreed to maintain anonymity of property owners, so

we're watching the samples being collected in the field. We're getting a certification that the samples are not going to be opened or have otherwise had their integrity compromised. They're being blinded by a third party and then submitted for analysis, and then we're going to get those results back, but we're not going to be able to associate a particular sample concentration with an individual property. So in that way, you're not generating data that's associated with a particular property, mainly to alleviate some concerns expressed by the City of Midland about potentially creating the situation where someone could be potentially identified as a facility.

AUDIENCE MEMBER: Thank you. I have one more question. When you made your presentation, Al, you referred to the fact that one of the major areas of deficiency that you're working on in this high priority is getting Priority 1 and Priority 2 sampling done. Is there -- are there disagreements with Dow and DEQ over how this should be done or the speed? What is the issue involved here?

AL TAYLOR: The issue in the initial notice of deficiencies that went out like starting in March and April of last year is we wanted to see that data collected very early within the remedial investigation

process. As you'll probably recall, there was very extended scheduling for the implementation of the RIWP. We have since reached agreement over the last couple of weeks, and I can look to Dow to confirm this as well here, that in order to move the schedule forward and address some of these major NOD concerns, EPA and MDEQ sampling of the Priority 1 and Priority 2 properties will be done in this Geomorph fashion, but it's all going to be done next year. So there's going to be -- those samples will actually be collected during the next field season rather than stretched out over four or five seasons I think that was originally envisioned by the December 2005 schedule. So we are in agreement now on that schedule and getting that data collected.

AUDIENCE MEMBER: Thank you very much.

CHUCK NELSON: We're back on schedule here. Mr. Reichel, are you ready.

ROBERT REICHEL: Good evening, everyone. My name is Bob Reichel. I'm not Judy Gapp as you have probably surmised from the agenda. Let me tell you briefly about who I am and what we'll be talking about. I'm a lawyer for the State of Michigan. I'm in the Attorney Generals Office. It's called Environment of Natural Resources and Agricultural

Division. In the course of my work for the State, I wear various hats, which include both the DEQ and the DNR. I'm here tonight, as Jim Sygo said earlier, essentially as a liaison for a group of governmental parties called the Natural Resource Damage Trustees who are engaged in a process of trying to begin to assess potential damages to natural resources and advance the process with the objective of trying to restore the damage to the environment to the extent that it's occurred and obtain appropriate compensation for that.

What I want to do tonight very briefly, three things. First, to give you a brief description of what the Natural Resource Damage Assessment process is, what is it, who is involved, the actors, and then where things stand now. Now I don't know how many of you attended a meeting just about a year ago, similarly a quarterly meeting, where one of the presenters was Lisa Williams from the U.S. Fish and Wildlife Service. Do any of you recall being there? For those of you who have heard parts of this, I apologize. I am not going to run through all of Lisa's presentation, but to give you some sense of what the status is, I feel it's important to give you, those present, at least a brief background of what

we're talking about when we're talking about Natural Resource Damage Assessment. So for that purpose, I've taken the liberty of not using the whole thing but using part of the power point presentation that Lisa presented. For those of you that are interested in this, I have available some copies of it on the table. If you are really interested in obtaining a copy, I'm sure you can get that from DEQ.

Let me move forward. As I said earlier, the goals of Natural Resource Damage Assessment are twofold, to restore injured natural resources and the services they provide. When you talk about services, what does that mean? Well, first of all, natural resources, as most of you intuitively understand, involve things like air, water, land, wildlife, fish, and the services that they provide include the uses that the public have made or could make of these resources, for example, recreational uses, fishing, consumption of game, hunting. Those are just examples. The basic goal is to try to make the public whole, to compensate appropriately where there has been an injury to natural resources. It's not to punish.

I won't really go into this, other than to say that the context of this is that under both Federal

and State environmental laws, some of which are listed here, there is a process whereby Trustees, that is entities who represent the public or different governmental entities who are charged with protecting the public's enjoyment and use of these resources, have remedies where they can go out, tools where they can go out and try to figure out if an injury has occurred, and if so, to begin to quantify, develop strategies for achieving the goals that I talked about a moment ago, that is, restoring and compensation, and under these Federal laws and regulations, as well as State law, there are processes that are typically followed.

I think I've just covered this. What is a Natural Resource Damage Assessment, the process by which the Trustees recover damages for injuries to trust resources, however caused, by releases of hazardous substances into the environment, and to restore the injured resources and the services they provide.

We talked a lot about Trustees. Okay. The base element of a Trustee is that they are a public official who is charged with representing the public interest in these kinds of resources. So the resources, as I've indicated, is very broadly defined,

and the resources belong to or are managed by, held in trust or otherwise controlled by, different governmental entities. Under this -- this is a quotation here at the bottom from one of the Federal laws. The acronym is CERCLA. It stands for what is commonly known as the Superfund Law, but leaving aside the legal detail, I'll be happy to get into this if you have questions, the basic concept under the law is that the United States Government, the Federal Government and Federal agencies, State or local governments, or any tribes that have interest in, manage or control certain natural resources that are covered by this legal framework can be or are recognized as Trustees.

I've talked about State and Federal. At the State level here in Michigan, under the law, the Governor is charged with designating State officials to act as Trustees on behalf of the public. In Michigan, the Governor has designated three agencies as Co-Trustees on behalf of the Michigan public. Those are the Department of Environmental Quality, the Michigan DNR and the Attorney General; hence, my presence here. This line refers to the U.S. Fish and Wildlife Service which is part of, as you may know, the Department of Interior, Federal Agency; the

Saginaw Chippewa Indian Tribe; the Bureau of Indian Affairs. This reference here to the NOAA, the National Oceanic and Atmospheric Administration, is potentially a Trustee but they aren't actively involved at this point.

So what does a Trustee do when confronted by a situation where there's evidence that a hazardous substance has been released into the environment which has the potential for damaging natural resources or impairing the use? We need to determine that there are resources that have been affected and the statute provides a common sense, and a good policy dictates that where you have multiple Trustees that they try to coordinate, and one of the ways they do that, which is already in play here, and has happened since the last time, one of myself colleagues, Lisa Williams from the U.S. Fish and Wildlife Service, addressed you about a year ago, is that the Trustees have gotten together and established among themselves an agreement called a memorandum of understanding. It sounds very bureaucratic but there's a good reason for doing that.

Each of the parties to this agreement agree to cooperative, coordinate their efforts in trying to determine what steps to take to assess whether there's been damage, quantifying it, and then pursuing as I

said the goals of restoration and compensation. So early in 2006, a memorandum of understanding was signed by the Trustees that I mentioned earlier, again on behalf of the State of Michigan, the DNR, the Department of Natural Resources, DEQ, the Attorney General's Office. On behalf of the United States, the Trustees include the Department of Interior, the Fish and Wildlife Service, the Bureau of Indian Affairs and also the Saginaw Chippewa Indian Tribe.

This is intended to provide an overview of what the process is so I can tell you where we're at in this, and they're broadly speaking three stages. The first one is the preassessment phase. As the name implies, it's a preliminarily step, and that's where we are at the moment. I'll get into that in more detail later. In fact, there is among the handouts something called a preassessment screen. I'll put those slides up. I'm going to give you a sense of where this fits in. So there's the preliminary step which is really geared towards determining is there a good reason and will be an appropriate use of governmental and public resource to go out and analyze whether there's been damages, to assess them, and then proceed with that assessment, and then this postassessment, implement actions to provide for

restoration and compensation.

The preassessment phase, which is basically where we are at right now, is a process under the regulations that the Trustees are directed to follow under Federal law. The Agencies basically ask themselves looking at currently available information as a threshold and that the goal is not to determine right then and there exactly how much damage has occurred, what its magnitude is, but rather is there -- does the available information at hand from multiple sources give the Agencies, or I should say the Trustees, a basis for saying, you know, there's a reason for concern here, there's a potentially significant impact, and so should we proceed further, and so that's the exercise that the Trustees have been engaged in since -- or one of the exercises since this group of Trustees was formed earlier this year.

Again, basically, the inquiry is, has there been a release of hazardous substances, how do these hazardous substances enter the environment, is there a reason to believe there has a potential for injury to resources, is there some potential for damages to those resources, and is there evidence to indicate that one or more parties may be responsible for them as a legal matter. The point -- this is not a

determination. It's not a judgment of liability, but rather, what the Trustees need to decide is if there has been this potential for injury, what does the available information indicate about who may be potentially responsible, because that then feeds into the process.

If the Trustees decide that these threshold questions are answered so that it makes sense to go ahead with this, with further evaluation, then one of the things they're directed to do, and one of the things that has actually very recently been done here, is how does Natural Resource Damage Assessment, how does this process fit into the other things that you've been hearing about, some of it here tonight and other previous meetings. As you're well aware, it has been discussed here under State and Federal and environmental or hazardous waste laws that there's a process for determining the need for corrective action, i.e., clean up of environmental contamination, including environmental contamination caused by historic releases of hazardous substances into the environment.

The Trustees under law are not required to be involved in that process, but the Trustees with the concurrence of Dow and the regulatory Agencies, that

is, the U.S. EPA and DEQ, wearing its hat as a regulator under the corrective action process, have all concluded that it makes a lot of sense for us, not only the Trustees, to coordinate with themselves but the Trustees to work with the other governmental stakeholders and Dow in trying to advance the process of this efficiently as possible, collecting the information that they need to have to make good decisions about trying to come up with remedies that are protective and remedies that also do no harm, as was alluded to earlier by one of the other presenters.

There's the potential that certain kinds of measures that will be implemented to mitigate, you know, erosion or re-erosion of hazardous substances into the Tittabawassee River, for example, that those very measures could themselves have adverse impacts on certain kinds of wildlife. So there's a desire and a need and an ongoing effort for representatives of the Trustees to work with the environmental agencies and Dow as they go about the process of collecting data, looking for options of clean up on a pilot basis, trying to take into consideration these potential adverse impacts on natural resources.

The process that the DEQ and Dow primarily, but with EPA oversight, are engaged in this corrective

action process. It's not identical to but it coincides in many respects with the Trustees' interests in reducing or avoiding further injury to the resources that we are Trustees for the public for and quite frankly to try to proceed at data collection and evaluation in the most cost effective way if possible. So what it means among other things is that even though they are not required to be involved in this process, DEQ, Dow and EPA have all agreed that on an informal basis there's ongoing opportunity for the natural resource Trustees I've talked about to be aware of and input into the work that is ongoing and that will be conducted in the near future to get to proceed as efficiently as possible to meet related and sometimes overlapping data needs, so we can get to the goals that we have of appropriate restoration, mitigating impact to the resources. As indicated here, the goal is to have remedial cleanup or containment of hazardous substances integrated as much as possible in other steps that are intended to restore the resources and the use of the resources.

So to summarize, it is complementary to -- I'm just skipping over these. These are some presentations that Lisa presented before. I'm not a biologist. I don't really feel competent in

discussing the technical details of this, but suffice it to say that, as a part of this preassessment screening process that I've talked about, the Trustee representatives have looked at some of the available data, including data about the contamination of fish, fish consumption advisories, some preliminary work on wildlife, and so forth. These are just examples. It wasn't intended to canvass the whole field, but the existence of those kind of data led the Trustees to conclude in this preassessment screen that has recently been completed that, yes, there is a potential for injury here that warrants further evaluation and working towards trying to get restoration to happen.

One of the benchmarks that the Trustees are looking for -- when we talk about restoration, what do we mean? Trying to restore the resources to baseline, that is, the condition that would have had the release of hazardous substances we're concerned about not taken place. It's important to understand that that can be both directly in the resource, contaminants and fish just an example, and resulting limitations or effects on the use of that resource, fishing, again using that as an example, but I want to emphasize that the goal is not -- in restoration is not to achieve

some pristine preindustrial development condition. The benchmark is rather that the Trustees in this process are looking at to say the goal to the extent possible or feasible try to restore the conditions, the conditions in the resource and the public's ability to use them in a beneficial way, to that which would have existed had the release of these hazardous substances not occurred, and again that can vary significantly depending upon, you know, which part of the site we're talking about, which resources. As we all understand from these meetings, just the presentations earlier tonight, we're dealing here with a very large and complex problem.

Let me share with you this other concept about what the Trustees are. This follows up what I said earlier. I think I touched on this, but the idea again is not to punish someone but to try to the extent possible to make the public whole, to get back to the situation where the resources are more usable, the full range of services. A concrete example would be getting to the place where we wouldn't have fish consumption advisories related to releases of dioxins and furans. I'm just using that as an example. This does not all just go to fish consumption advisories. I don't want to leave you with just that much, and

also to compensate the public in terms of restoration. These can be under the legal framework the Trustees operate. They can be a variety of measures to restore, rehabilitate or replace that which is required.

What does that mean in plain English? In other words, the range of options that the Trustees can look at in trying to come to an appropriate compensatory restoration scheme can involve not only resources that were directly affected by the presence of hazardous substances but other mitigative or restorative measures that improve or enhance the use of these resources in the same area, so that again trying to pursue the goal of making the public to the extent possible whole and trying to do this in a rational and orderly way. That as I said earlier is tied into and integrated with the process that's unfolding between Dow and DEQ and EPA's involvement of corrective action.

I think I've touched on these. These are points that Lisa explained as to why we want to try to integrate it and why we are integrating it. As of last year, these are what have been identified by the Trusteeship that's been done, coordinate with clean up activities. As I said earlier, that is being done.

Trustees or representatives are regularly involved in and have an opportunity to have an input into development of various workplans that are underway and will be taken, again with the goal with proceeding as efficiently as possible. Organize Trustees, that's been done. As I said earlier in the beginning of this year, the State, Tribal and Federal Trustees signed this memorandum of agreement. If you're interested, we can make a copy of that available to you. It basically says that the Trustees agree to cooperate with one another and proceed in a coordinated fashion working with other interested parties in the process for assessing natural resource damage.

Write a preassessment screen, okay, which brings us to what the current status is, and with that, this is where we are at as I started to explain earlier. The purpose of this, as I've talked about, we've looked at to review the information that's available, didn't involve some new collection data activity but looking at information that's on the shelf, review that to insure that there's a -- it's reasonable to proceed with further activity assessing the damage, because there is -- there is something there that simply put may be worth pursuing in terms of the substantiability of it, the nature of the potential

impact to the resources. I'm going to skip over these regulations. If you're really interested, I can respond to those questions.

I think I've touched on this. These are the criteria that the Trustees ask themselves. We've talked about that, but the Trustees have looked at the data, reached the conclusion that each of these sort of screening criteria are satisfied with respect to historic releases of hazardous substances, specifically dioxins and furans from Dow's manufacturing facility, and that's where we're at. We determined -- and this is actually this document -- there's copies of it available at the back table there if you're interested in reading it -- that recites what I've just described to you. This is what the Trustees looked at, this is what they've concluded.

Another document attached to that, and again this is something that follows from the regulations for Natural Resource Damage Assessment that the Trustees are trying to work under, which involves a process of notifying in writing a potentially responsible party, that we've done that, and what conclusions we've reached, and most importantly on a going forward basis, invites the party that the Trustees have identified as potentially responsible, in this case

Dow Chemical, to participate in this process, and we very recently, just earlier this week, provided some writing to Dow. I don't want to put them on the spot, but I do know that we are following the process that's laid out. We are inviting Dow to partner with the Trustees as we proceed with this process of going further, assessing the natural resource damages, and most importantly working towards an appropriate plan or set of measures to the extent that we can restore the affected resources, provide for compensation and to integrate that with the remedial work.

Next steps, the assessment phase, it's going back to one of the earlier slides. We've crossed -- the Trustees have crossed this threshold, meaning we need to engage further on this. So we need to try to determine, not with mathematical precision, but to further estimate the nature of the damages or potential damages to the resources, again ultimately trying to get to the question of what restoration makes sense here, what compensation makes sense here. So as I've already described, we're going to continue to coordinate with the corrective remedial activities, so essentially in the risk of sounding a little too flippant about it, trying to build on or essentially piggyback with, integrate with, ongoing data

collection activities, and again we're extending -- the Trustees have, you know, formally and informally indicated to Dow where we are, you know, seeking their involvement in this process and so that we can all move towards information and conclusions that make sense and we hope can form a basis or ultimate consensual resolution for everyone involved.

There are -- under the regulations, and again I won't go through chapter and verse, there are plans that are typically developed to assess the injuries and to evaluate resource -- a plan for trying to get to this issue of compensation, what sort of -- how are we going to determine what compensatory activities make sense. There are plans for that that the Trustees expect to proceed on. The Trustees through some funding with DEQ have retained the services of a contractor to assist them in putting together some of these plans and some of the preliminary steps that we need to -- as I said, we've extended an invitation to Dow and we expect at least -- you know, I won't speak for them, but I think we're striving to have open communication with Dow on the development information and I'm encouraged so far, not in specific response to this letter because we just gave it to them, but in general with Dow's expressed interest, and I'm

speaking not just individually but as a Trustee, in general Dow's expressed interest in trying to work in a collaborative fashion to address these issues.

An important point that I really want to emphasize here is that under the regulations that guide the Trustees, because remember the whole theory of this and the reality is that the Trustees, these governmental entities, are acting on behalf of the public as a whole. We, the governments, State, local or Tribal, hold these resources in trust for you all and everybody in the State and the country, and so we expect to move into this process, opportunities for public comment and participation on the plans that are developed to assess damages through this assessment phase, and ultimately whatever decisions are made about the appropriate restorations.

That's all I have. If I repeated things that Lisa told you or you heard before, I apologize. I wanted to give you some context. I'll be happy to respond to some questions.

CHUCK NELSON: Is there a question or two for Bob? Sir.

AUDIENCE MEMBER: I was going to ask this later, I did ask DEQ earlier, are you including brine leaks -- past brine leaks problems in this, too, or

just dioxin?

ROBERT REICHEL: The focus is on the historic releases from the -- of primarily dioxins and furans from the Dow manufacturing facility. We haven't been focusing on issues related to releases of brine into the environment to answer your question.

AUDIENCE MEMBER: Dow has contractors out doing residual brine evaluations on wetlands and other sites. I don't know how many sites. I know they're doing it on their wetlands, so that's why I asked.

ROBERT REICHEL: And again, I don't think -- the Trustees haven't ruled out the possibility of looking at those issues, but the process I've described so far in this document that I've mentioned earlier is focused on the specific issue of historic releases from the Dow manufacturing complex, focusing particularly on dioxins and furans.

AUDIENCE MEMBER: John Wiltse from Loan Tree Council and Director with MUCC. On the NRDA process, how does the public trust doctrine -- or does the public trust doctrine have any bearings on the process you're going through with Dow?

ROBERT REICHEL: The question is, how does the trust doctrine have any bearing on this process. The public trust doctrine, for nonlawyers in the

group, is a body of law that has been recognized, you know, by Judges, even apart from statutes, that basically embodies the notion that certain resources are held by the State or some other entity in trust for the public and that the governmental agents are charged with protecting them and their use. I guess the short answer to your question is that the statutory process that I've described under -- for example, a lot of this stuff that I referred to is under the Federal Superfund law. There's also the State law. They basically build up on this same concept of public trust.

In other words, the whole idea of Natural Resource Damage Assessment under these environmental laws builds upon and is consistent with the basic long established legal principle that the resources, the water, air, land, wildlife, fish, for example, do not belong to one individual, you know, but that there are certain public rights to use them that are held in trust by the government for everyone. So the short answer is that process or that concept is built into the statutes and the regulations that were already founded.

CHUCK NELSON: One more question and then I want to move on. We're going to get time at the end.

AUDIENCE MEMBER: I've asked this question before at other meetings and I think it's important that we qualify the type of testing that is taking place determining injury. Are you taking it to the cellular level? Because I can remember 30 some years ago testing Thalidomide which was tragic to pregnant women was not found initially to have any adverse effects until they found it in the cellular testing afterwards. My brother was one of those finders.

ROBERT REICHEL: As I said earlier, I'm not a biologist, but I think the short answer is that I don't think the Trustees have ruled anything in or out at this point. I think the short answer is what I expect the Trustees are going to be looking at, at least initially, for example, for impact on fish, wildlife or other resources, would not necessarily go to that level, but I can't really speak to that. I mean, Natural Resource Damage Assessments or evaluations look, among other things at, not just limited, but how populations are certain, wildlife, fish or other organisms may be affected, how the health of it may be affected, the diversity of it may be affected. I mean, there are a variety of things that can be looked at but the -- I'm not aware of any

current plan to focus specifically on the cellular level, but again I think the plans for assessing the injury will try to build upon some existing data and develop further information about what impacts have occurred as a result of these historic releases.

CHUCK NELSON: Again, we'll have more time for questions. Dr. Garabrant.

DR. GARABRANT: Thank you for letting me speak tonight. Good evening everyone. I want to talk to you about what we've been doing on the University of Michigan dioxin exposure study. Some of this will touch on material we presented in public in August, but I want to go into more depth because I believe this audience has not heard sort of the deeper explanation of the things that we discussed back in August, and then I'm going to talk about what we're doing currently.

Our study at the University of Michigan was funded by the Dow Chemical Company through an unrestricted grant to the University of Michigan and we have conducted this study independently. I always acknowledge my team, and as I have said a number of times, the principle question this study seems to answer is whether human dioxin levels in people who live in Midland and Saginaw are related to soil dioxin

levels and more importantly what factors predict serum dioxin levels, such as age, sex, body mass index, fish consumption, meat consumption, hunting, fishing, living near Dow, living near the river, soil contamination, house dust contamination, and et cetera.

We studied people who live in five different geographic areas, people who live in the floodplain or their property is in the floodplain, whether their home is or is not, the near floodplain, the people who live downwind of the Dow plant, people who live in other areas of Midland and Saginaw and then for comparison people who live in Jackson Calhoun Counties about 100 miles away. We interviewed these people. We got blood. We took soil from their properties and household dust that we vacuumed their homes, and we had 695 Midland Saginaw residents, 251 Jackson Calhoun residents who gave blood samples and who were interviewed.

First off, this is a plot of the blood dioxin levels expressed as the TEQ. That's a weighted summary of all the dioxin chemicals in the blood, and what you see is it's a skewed distribution with some values out to very high numbers. If we take the logarithm of that, it actually becomes a symmetrical

distribution, so we call this a log normal distribution. So now looking at the logarithms, the tails on both ends are pretty much equal. We have done quite a bit of statistical analysis. This is the result of linear regression modeling, and I realize -- I was cautioned by Beth Hedgeman that the print is way too small, but what I want you to see is the pattern of green and red. Essentially, over here on the left, we've listed the factors that explain why people's blood dioxin levels vary, things like age, body mass index, male or female, pack years of smoking, breast feeding babies, et cetera, and the red findings indicate that blood dioxin levels go up as these factors go up. So as we get older, our blood dioxin levels go up. The green ones indicate that your blood levels go down as these factors go up. So, for example, as people smoke, smoking is associated with lower blood dioxin levels. So we've done a great deal of statistical analysis to understand what factors explain why our blood levels vary as a population.

The most important factors by far are age, sex, body mass index, and rather than have you try to interpret what's on this graph, it's easier to show a picture of that. What this picture shows is that as age increases, here from age 20 up to age 70, blood

dioxin levels go up in men, which is the blue bars or the blue markers, and in women, the red markers. They go up slightly higher or faster in women than they do in men, and we've also put in here how they vary according to body mass index. Remember, body mass index is a measure of how fat we are. People who are fatter have higher body mass index, and what we see is that in men fatter people have higher levels than thinner people, and in women, it goes the opposite way. So age, sex and body mass index are by far the most important factors that explain the amount of dioxins in our blood.

We presented this in August, which also shows the age relationship, comparing people who live in the floodplain to people who live in Jackson Calhoun. So it really is showing the same data, just using bar charts, showing that as age increases, blood levels also increase. I like the previous graph a little better. It says more.

We showed this graph in August and a lot of comment was made regarding this, and some of it didn't really represent the graph accurately in my opinion. We pointed out that the blood levels of dioxins in the floodplain, and to some extent in the near floodplain and to some other extent in other areas of Midland and

Saginaw, were higher than the blood levels in Jackson and Calhoun, and we also compared them to the United States general population using data from the National Health and Nutrition Examination Survey, which I refer to as NHANES, and so we see that Jackson and Calhoun and the national data from NHANES are almost identical but there are some areas of Midland and Saginaw that are higher. The point I want to make and wanted to make in August is that these differences are largely due to age and other factors. They are not largely due to the contamination in Midland and Saginaw or due to living in Midland and Saginaw. They're due to age differences.

Now some people might wonder, well, why do you have age differences? Well, for example, the people who live in the floodplain who are on average older than the people who live in some of the other areas. Why is that? Well, the floodplain properties are nice houses. They're on the river. They're expensive, and people don't tend to move there until they get a little bit older. So what you're seeing here is a difference that is due to many factors but mostly things like age, sex, body mass index, and not factors related to the pollution. A small amount of it is due to the pollution.

Okay. I want to talk about what is the effect of living in the region. We put this in our booklets but I wanted to show you the data. What we see here is the five regions, floodplain, near floodplain, other areas of Midland and Saginaw, Midland plume, and Jackson Calhoun, and we do see that living in the floodplain, near floodplain, other areas of Midland and Saginaw and Midland plume does contribute to the blood levels of these compounds. Okay. So this is 2,3,7,8-TCDD, and this is a pentafuran and this is a pentadioxin, and the pattern is there for living in this region for those three dioxin compounds, but the contribution, even though we found these effects, these are very small effects. Okay. And if you'll note over here, the PCBs, we really found almost no contribution to the blood PCB levels from living in the region, and as far as I'm aware, PCB -- Dow does not make PCB. If they emit them, it is probably similar to other industrial users of PCBs. It doesn't appear that the blood dioxin levels or the blood PCB levels have much to do with living in this area.

Okay. We looked carefully at soil, and what we see is that the soil around the home, in the top one inch around the house perimeter, wasn't really related to the blood dioxin levels, with the exception of two

PCB compounds. We looked at garden soil. We did find a relationship for TCDD and one of the PCBs, and we looked at household dust, and we did not find a relationship between household dust dioxin levels and blood dioxin levels, with the exception of one PCB compound. Okay. So I think that's probably the most important set of findings coming out of this study.

Okay. And here I've summarized what we've said in the booklet. We do have booklets in the back if you did not get one in August. It was the same booklet that was handed out on August 15th. I want to point out some of the findings for foods. We found that eggs were important predictors of blood dioxin levels for almost all of the dioxin compounds we've analyzed so far. It's important to recognize that these are not eggs from the contaminated area. These are store bought eggs, and for one of the PCBs, store bought milk. These are home raised eggs but not from the contaminated area -- I misspoke -- and store bought milk. So we did find significant findings for eggs but not eggs raised in the contaminated area.

We found for vegetables, most of the findings are green, meaning the more vegetables you eat will lower your dioxin levels, and interestingly, that was true whether the vegetables were raised in the Saginaw

River floodplain or the Tittabawassee River floodplain, with a couple of exceptions, but largely it's green. In our analyses, store bought vegetables did show a positive relationship for one of the pentafurans, and largely for the rest of them, whether they were home raised or no matter where they were home raised or store bought or whether they were root vegetables, people who ate vegetables had lower dioxin levels. That is probably due to the fact that the more vegetables you eat the less meat, fish, dairy and poultry you eat, but this is an important finding, because it suggests that even if the vegetables are root vegetables raised in the contaminated areas they are not contributing to the blood dioxin levels.

Fish, we did find that eating fish from the contaminated area, this stands for Tittabawassee River, Saginaw River, Saginaw Bay, in the past 25 years was associated with some of the dioxin compounds. We also found that fishing in the Saginaw River and Saginaw Bay was associated with some of the dioxin compounds and some of the PCBs, and so we said, eating fish in general, eating fish from the contaminated areas and fishing from the contaminated areas are associated with higher dioxins in blood.

Back in August, we gave a presentation on the

magnitude of these findings. I want to point out as you saw in the previous slide the findings for the fish really relate to fish from this region. We have not identified a contribution from Dow's pollutants versus other sources of pollutants. What we've been able to show so far is that eating fish from the contaminated area, Saginaw River, Saginaw Bay, Tittabawassee River, does contribute to the blood TEQ. These are relatively modest contributions, so about 1 to 2 percent per year of consumption of fish, and so they contribute to the TEQ in your blood, TCDD, the pentadioxin and the hexodioxin.

Okay. This is a very important table. Now we didn't show this in August. This is a table that explains how much of the variation in blood dioxin levels is explained by these various factors. So the idea here is that we all have measurable dioxin levels and we vary, and if you want to explain why we vary, it's important to look at what this table says. So let's look at the TEQ first. All right. All of the factors that we've been able to examine together explain about 78 percent of the population variation in blood dioxin levels. This is very, very good. That we can explain this much of the variation in blood dioxin levels. Among that or among the

variation, what I've labeled here as health, and that's short hand for age, sex, body mass index, breast feeding of babies, and smoking, and a few other factors, explain about 50 percent of the variation in blood TEQ. So this is really -- these are the factors that are the most important.

Food, about 4 percent, and that includes all food, so that includes fish and milk and dairy and game and meat, whether it's store bought or whether it's from the contaminated areas, and so food is important but not nearly as important as these other factors. We did find that some jobs are associated with higher dioxin levels and they have relatively modest contributions, so about a little less than 2 percent of the variation in blood dioxin levels explained by work, and then what I want to get to is the variables over here. This is what we're all most concerned about.

Activities in the river and on the floodplain, water activities, so hiking, swimming, camping, picnicking, recreating explains about a third of a percent of the variation in blood TEQ. Simply living in this region, even though we found that there were statistically significant associations, it only explains about 6/100 of a percent of the blood TEQ

variation, so it's very small factor. Living on contaminated soil about 5/100 of 1 percent, and household dust, practically zero, so that's for TEQ. Now as you look down the other compounds, we do get slightly different answers, but largely, the same pattern holds, that the age, sex, body mass index, smoking, breast feeding are the big explanatory factors. Food is next, sometimes 9 percent, not trivial, sometimes 11 percent. Work explains a few percent, but when you come over here to living in the region, living on contaminated soil and having contaminated house dust, these are very small explanatory factors. That's really an important point that we wanted to emphasize.

We did find that properties in the floodplain had higher levels of dioxins. Here we are showing the percent of properties that had a dioxin TEQ above the State of Michigan's residential soil direct contact criteria of 90 parts per trillion. 42 percent of the properties in the floodplain were above that 90 PPT level. In the near floodplain, about 11 percent. In the plume, I guess about 30 percent. Other areas of Midland and Saginaw, 4 percent, and Jackson Calhoun, 1 percent. Interestingly, 1 percent of properties in Jackson Calhoun are above the Michigan 90 part per

trillion level.

We have analyzed and are still analyzing the differences by region. This is looking at the house perimeter top 1 inch, and these are what are called box and whisker plots. It's a very nice way of summarizing the distribution of data. The little cross in the middle is the geometric mean. The box represents the 25th percentile to the 75th percentile of the data. The lower whisker represents the 1th percentile, the bottom 1 percent of the data, and the upper whisker the 99th percentile, so you can see in a picture what the distribution looks like. In the soils, there's no question that the plume of -- the soils in the plume downwind of Dow had a higher median and the 25th and the 75th percentiles were higher than they were in the floodplain, than they were in the near floodplain, than they were in other areas of Midland Saginaw, and for comparison in Jackson Calhoun. We did see that the soils had more dioxin on average than Jackson Calhoun, in all of the areas in Midland and Saginaw. So these plots -- I'm putting them up -- these are on our website. You're welcome to see them. This is all publicly available information now. The only difficulty is finding your way to the graphs because we have put so much

information on the web now.

Looking at how much dioxin versus how much furan versus how much PCB is in the soils by region. So what this plot shows -- again these are box and whisker plots comparing floodplain, near floodplain, other areas of Midland Saginaw, plume downwind of Dow, and Jackson Calhoun. What we see is that the soils from the plume are much richer in dioxins than are Jackson Calhoun and frankly then are the rest of Midland and Saginaw. In contrast, when we look at the furans, the soils in the floodplain are richer in furans than Jackson Calhoun, and so are the soils in the near floodplain, they're richer in furans. The rest of Midland and Saginaw really not different than Jackson Calhoun and interestingly in the plume less furans, but that's probably because there's more dioxins, and then when we look at PCBs, the soils in Jackson Calhoun have proportionately more PCBs than do the soils in Midland and Saginaw. I know I'm going fast.

I want to talk quickly about the communications effort. We presented our results in Midland and Saginaw on a Tuesday, August 15th. We took 16 of our team members to the International Dioxin Conference in Ozlow and presented all of our papers, 31 papers, the

following week. My team worked incredibly hard. They did a superb job, and we have now posted to our website all of the papers that we presented in Ozlow so that you can read them and study them. If you go to our website and you go to presentations, you can find all of the things we presented in Ozlow. It's called the Dioxin 2006 conference. These are the oral presentations and then all the posters. There are 31 of them, and you can download them and study them.

Okay. Questions that have been asked or comments that have been made in the press and in various media around Midland and Saginaw that I think we need to answer. The comment has been made that our study did not include children. That is true. Our study included only people over the age of 18 at the time of participation, and that was because we could not draw 18 milliliters of blood from children, and we felt that getting consent from children would be very thorny for an environmental study. We chose not to do it. I want to point out though that 50 of the people in our study from Midland and Saginaw resided in their present homes before the age of 20, so they were, in fact, children during the times they had exposures that are of interest in our study. We will be providing additional analyses trying to comment on

what we can say about childhood exposures. So it's true we didn't include children at the time of participation. It is not true that our study is irrelevant to the concerns about childhood exposures.

The comment has been made a number of times that Michigan dioxin blood -- that the blood dioxin levels are much higher in Michigan than they are at national levels. The comment has also been made that they're higher in Midland and Saginaw than the national levels and in the floodplain than the national levels. First off, this is not correct. In fact, the U.S. National levels from the NHANES data and also from the National Center for Environmental Health Laboratory at the Centers for Disease Control are roughly the same as our levels after comparing people at the same age. So once you control for age differences, what we found here in Midland and Saginaw is very similar to what NHANES and the NCEH found. Moreover, the NHANES and the NCEH data did not include several of the specific dioxin chemicals that we included in our analyses. This makes our blood levels slightly higher simply because we included more congeners in our total. If you could adjust for taking those cogeners out that we included and that NHANES and NCEH did not include, it would bring our levels down a tiny bit, and so just to

reiterate, when we looked at our levels, our levels in Jackson Calhoun and the NHANES data were very, very similar. They were very similar in plume. They were higher in the floodplain and near floodplain, but a lot of this is due to age differences and differences in other factors.

Another comment has been made that we found that breast feeding reduces blood serum dioxin levels in women, and we did state in our booklet and we've stated publicly that the benefits to the infant from nursing outweighs the potential health risks of dioxin exposure. We take that opinion directly from the EPA and the American Academy of Pediatrics who have both concluded that the benefits of breast feeding outweigh any potential risks, even among mothers who have increased dioxin burdens, and the source for that is the paper by Matthew Lorber who is an EPA scientist that published this in the Environmental Health Prospectus in 2002. We believe that that is still good advice.

Comment has been made that Midland dioxin serum levels were affected by the sample location which the U of M has kept strictly confidential. We are obligated to maintain the confidentiality of our study participants. We cannot reveal the locations of

sampling, and there's nothing more I can say about that. Everybody knows that the soil levels vary, and clearly, Dow and DEQ are in the process of describing soil variation in far greater detail. They do vary, but I cannot comment on where our participants lived.

The comment has been made that our report contained several unexplained discrepancies between the number of blood samples and the number of environmental samples collected. This is incorrect, and as we presented in public and as you can read on the website, 946 participants gave blood samples. Of these, 766 were eligible and consented to soil samples. We got all their soil. 764 were eligible and consented to household dust samples. No samples were lost or omitted. The protocol for eligibility for sampling is on our website. You're welcome to read it. The reason that we don't have 946 participants with soils or 946 with blood is they weren't all eligible. Remember, you had to own the land in order to consent for soil sampling. You had to own the house or the apartment or the condo in order to be eligible for house dust sampling, not everybody did, and some people didn't want their dust or soil sampled. Every sample we collected has been analyzed and included in our data set.

I'm happy to take questions. Thank you.

CHUCK NELSON: Seeing no questions, we're going to go -- oh, go ahead.

AUDIENCE MEMBER: John Wiltse. Doctor, on your sampling, especially concerning women and child bearing, infants and so on, were you using total body burden data on those tests?

DR. GARABRANT: Well, as I believe you know, we measured the dioxins in the blood lipids, and the blood lipid dioxins accurately represent the dioxins in the fat in the body. So it is widely held that blood dioxin levels represent body burden.

AUDIENCE MEMBER: I'm still a little bit uncomfortable with not being able to thoroughly check the reproduction process in this issue. I realize there's a lot of moral probably questions to ask about it, but that seems to be an area that we should be more concerned about than anything on your presentation here, the future generations and so on. I don't know how we're going to get that information, but if you care to comment on it, I'd appreciate it.

DR. GARABRANT: You know, I think it's important to recognize that our study is an exposure study and that our study gives us a wealth of information to help the State of Michigan, the people

of Midland and Saginaw figure out the extent to which what's in the environment is getting into people's bodies. This is an important set of findings. It helps to guide us to move forward. We did not include babies. We could not. We can't take 18 milliliters of blood from babies. You'd have to take a small sample and you wouldn't have the ability to detect blood dioxin levels in babies because of the small sample. I agree with you that this is an area that we would like to know more about, but it is not something that our study was capable of addressing, and I think it would be very challenging for any study to be properly designed to do so. I mean, it's a real dilemma. Thank you.

AUDIENCE MEMBER: Two quick questions, Dr. Garabrant. Thanks for your report. The first one is, the slides that you showed this evening, particularly the one table that showed the distribution of contribution of health, are those going to be made available on your website also or could they be?

DR. GARABRANT: Which one are you talking about?

AUDIENCE MEMBER: The one that shows health is 50 percent that you could measure 78 percent --

DR. GARABRANT: The contribution?
AUDIENCE MEMBER: That one.
DR. GARABRANT: I believe this is on the website already in the presentation I gave in Ozlow. You have to look for it. I apologize. There's now hundreds and hundreds of pages of material. If you go to -- I can probably show you where it is. If you go to -- so this is our website. If you go to presentations, what the study showed, presentations, that will take you to this page, and if you look at this one, environmental factors that explain variation in serum dioxin concentrations from a community in Michigan, USA, I believe you'll find them.
AUDIENCE MEMBER: And then the other slides where you clarified questions or comments that have been in the media, like your last four slides, could those be made available also on your website?
DR. GARABRANT: We are doing that. That is time consuming. All of the questions that were asked at our public meeting on August 15, and it was a stack of question cards about this thick, my staff is preparing answers to all of those, and we will have those posted on the web. I'm not sure what to promise, as soon as we can.
AUDIENCE MEMBER: I was just asking about

the ones you presented tonight.

DR. GARABRANT: Yes. We will put these on the web also.

AUDIENCE MEMBER: And also just to clarify, because for the past several years figures have been thrown around that soil contributes something less than 1 percent, are you saying that soil as a factor contributes 5/100 of 1 percent to the overall burden?

DR. GARABRANT: Well, let's be careful how we say it. First off, for the TEQ, it's not quite accurate to say that it contributes 5/100 of 1 percent of the overall burden. What is accurate to say is that of all the variation in blood levels in the population -- right, we all have measurable levels and we're all different -- soil explains very, very little of why we vary, in contrast to age, sex, body mass index, smoking and breast feeding. So this is 100 fold -- explains 100 fold more variable than -- Brenda, my statistician, is going to object if I say that. Let's just say that this is very small and this is very large.

AUDIENCE MEMBER: Thank you.

CHUCK NELSON: One more question here because we have one more presentation.

AUDIENCE MEMBER: Hi. My name is Kathy

Henry. I live on the floodplain. I'm just a little concerned about the way, Dr. Garabrant, you appear to present your study. I know it's probably in everyone's best interest in this community to possibly downplay the fact that people are picking up the dioxin simply from living in the floodplain, where the other factors that we knew about, the food, the age, smoking decreases it. I mean, these are things that people knew, that studies showed before your study. I mean, this is something that we already knew, and I just -- it very much concerns me that this community is trying to make light of the fact that the amount of dioxins people are picking up from their yards just from living here is just -- it's just a small amount. It's no big deal. It's just a small amount.

I mean, when you think about other things like secondhand smoke in a restaurant and children and they're exposed for one hour, oh, my God, you got to get them out of there. You can't smoke by the front door. It's bad. It's bad. It could cause cancer. Dioxin can cause cancer probably. It's also a hormone inhibitor. It bioaccumulates like you had said. An exposure, half of it is still with you seven to ten years later. Children's toys that are made out of the country containing lead, they're immediately banned

because of the possibility that a child could put that toy in his mouth and possibly pick up some lead from that toy, and just the way your presentation has come off, in my opinion in this community, is that, well, yeah, just from living there you're only getting a little bit of dioxin, it's just a little bit, it's no big deal, and I just don't think that's a proper way of going about this.

DR. GARABRANT: Well, Kathy, I hear your point. The point of this study was focused exactly on trying to provide answers to your questions, in other words, to say, look, many people are living on contaminated soil, is that responsible for the dioxin in their blood, and the answer from this study is, that's pretty small.

AUDIENCE MEMBER: But it is partly responsible. That's the whole point. We already knew our diet and other factors, age. I mean, that was known years before your study ever even started. That was a known fact, but just the fact that, yes, people who are living here, simply from living in their homes, are picking up a small amount of this stuff. I mean, like I said, you ban secondhand smoking from restaurants and public workplaces, even if a child is only exposed for one hour in a restaurant, and yet,

you know, this is really being made light of, and I think it's wrong. I think it's morally wrong.

DR. GARABRANT: I'm not making light of it. We take this very seriously as a team, a very large team of very dedicated people who have worked for almost three years to provide these answers. I believe these are reliable answers and they give us the best possible information to answer your concerns.

AUDIENCE MEMBER: I don't disagree with that at all. I just disagree with the way it's presented.

DR. GARABRANT: Okay. Well, it is what it is, and we've tried to make the numbers as clear as we can. We've posted them to the website. It's all out there, and as we've said in public, for example, eating fish from a contaminated area, for each year you consume it, it's about 1 to 2 percent -- it contributes about 1 to 2 percent to the blood TEQ, TCDD, PCDD and HCDD. That's what the numbers are.

AUDIENCE MEMBER: That's good. I just wanted to let you know how I felt.

DR. GARABRANT: Thank you.

CHUCK NELSON: Thank you. We need to get our next presentation up. Art.

ART OSTASZEWSKI: My name is Art Ostaszewski. I'm with the Michigan Department of

Environmental Quality and I am part of a work group that was assembled to develop studies that will help assess the potential use of sediment traps in the Saginaw River. This is an aerial photo -- the new Google Earth aerial photo of the Saginaw River with the Green Point down in the lower left going all the way out to the Bay. I'll refer back to this picture as the presentation goes along. My presentation will be an overview of the background, context, location, what some of these studies, the questions that they'll answer, the time frame that we're working under, and my last slide is where additional comments and information if you have questions where to address them.

The studies, there were some initial background reports that were conducted by Dow under CH2M Hill, the MDEQ and the U.S. Army Corps of Engineers, very significant reports, that identified elevated levels of dioxin concentration. Primarily, you'll see here in the sediments of the nonnavigational portion of the Upper Saginaw River from Green Point primarily to the Sixth Street Turning Basin, and to note that our eye levels there in the lower right and that dotted red circle area on those peaks, those are dioxin concentrations in the sediments. We did not find very

high concentrations in adjacent floodplains. So again my emphasis is that our -- from a background data perspective, those reports showed high levels of dioxins in the nonnavigational portion of the Upper Saginaw River.

A review of some of the historical reports that were written, I identified one by the Army Corps of Engineers that kind of gave us a jumping point. They did a study in 2001 entitled Sediment Trap Assessment in the Saginaw River, Michigan, and what they looked at, specifically under a theoretical and modeling analysis, were four sites in the Saginaw River at different depths. They used three different depths and three different sediment trap links in a modeling scenario to kind of come up with what's the best way to trap sediments if we were going to do this in the Saginaw. Their summaries -- their findings basically, sediment traps built into the Saginaw River could capture up to 88 percent of total sands and 12 percent of the total silt. Primarily, the factors that attribute to those efficiencies are the width of the trap, the wider the better, it slows the current down, the depth of the trap below the navigational bed, less here the deeper you go, and to a lesser extent the length of the trap, only up to 300 feet did deficiency

increase. The study concluded tandem use of traps provided the best ability to capture as much sediment as possible.

So to continue on from a context perspective, the Trustees that Bob mentioned earlier, along with MDNR, we also included Army Corps of Engineers which I mistakenly left out, we looked at sediment concentration data. We were also cognizant of what was happening at the Sixth Street Turning Basin as far as the remediation that was going on there. So we had these studies that had sediment concentrations and profiles, and we thought, well, what questions do we need -- additionally need answered to look at sediment trap potential in the Upper Saginaw River, and out of that, out of those discussions came two studies, one in Ojiboway Turning Basin, which is a historic turning basin -- I'll get to the locations here in the next slide -- another study at the Sixth Street Turning Basin, which has recently been dredged or emptied.

Here's the Upper Saginaw River again from Green Point out to the Bay. Our study areas for the sediment trap, Ojiboway Island, is the Turning Basin. That is full. It was the historic terminis of the navigational dredging. About 25 years ago, that extent was pushed back to Sixth Street, so Ojiboway

Island or the Ojiboway Turning Basin, which is just below Ojiboway Island, filled in, and as most of you know, Sixth Street Turning Basin was recently dredged, so that is empty. We are cognizant as a work group that there are other turning basins in Saginaw, those being one on Skull Island and one in Essexville.

So we're doing two studies to look at sediment trap characterization, one at Ojiboway and one at Sixth Street. The Ojiboway -- the first study at the Ojiboway Island Turning Basin, basically, these are on our website, the study plans, but in synopsis, what we're trying to learn from what's happening at Ojiboway is how this sediment basin has filled in over the past 20 years, looking at the layering of the sediment, sediment characterization, sand, silts and also looking at the layering that has happened over historically for contaminant concentrations as well. For the Sixth Street Turning Basin, that's the one that's recently dredged, we had an opportunity to look at how this area will fill in. So the study objectives and the questions that we're going to answer there is the mass, what's entering, what's exiting, an area that's recently been dredged, a quantification of both the sediments as far as cubic yards are filling in, and also of the contaminant

deposition from a mass perspective, assessing the feasibility and performance of the dredging that occurred at Sixth Street, and establishing performance criteria for design, and that's in comparison to future potential uses or looking at sediment basins as something that we want to do in the future, and also scale and design information needed for full scale or long-term sediment trap use, and also the Corps is very interested in our studies and they're part of our work group to look at long-term river maintenance.

I want to mention one more thing that I think I kind of glossed over on Ojiboway Island and that's number three. We're comparing the characteristics also of what has settled out, both at Ojiboway from an historic perspective and at Sixth Street, and we're working with the ATS team, and some of the geochemistry characteristics that they're also looking at we're also applying those to those turning basins, so I wanted to be sure that I touched upon that.

From a time frame perspective, a lot of things have already happened. First week of November has passed, and from what I understand, the multibeam and bathometry and sonar work has been done, so this has basically created a base map of how deep the layer or the contour basically of what Sixth Street is right

now, and we will be redoing that on a periodic basis to see where the accretion of sediments have accumulated. We're right now in the second week of November. Their teams are deploying sediment traps to kind of get an idea how fast sediment traps fill in, in the Sixth Street Turning Basin, so we can get an idea of how long we can leave them out. The third week, we're looking at additional bedload sampling, what's traveling along just the bed of the river on both -- well, this third week will be a dry weather type of event, and the fourth week we're going into Ojiboway Island Turning Basin and doing the actual coring that will give us the information on the layering aspects.

In the spring 2007 -- so basically we'll work as long as we can this year. In the spring 2007, we have planned some additional dry weather events and wet weather events. From a time frame perspective, we're looking at about nine months duration for these studies, and we're in -- we're very happy that we completed some of this work this year and not have to wait until next spring.

From a contact perspective, if you have any additional comments or questions, Jack Bales, my public sector consultant, is chairing our work group

and he can direct your questions to the proper technical person, whether it's Army Corps of Engineers or MDNR. The studies are available electronically, and instead of giving you a long HTML address, you can just go to Google and type the search, Saginaw sediment trap, just those three words, and you'll get the Army Corps of Engineer study and our studies, study one and two for the -- that we're doing currently, and I think that's it.

CHUCK NELSON: Any specific questions for Art? Seeing none, then we have ten minutes left for questions and comments. We had a really intense number of presentations tonight and I did my best to move folks along. We had very complex information and they did a tremendous job. Terry, go ahead.

AUDIENCE MEMBER: Okay, Chuck. The agenda calls for other related matters or future agenda topics. On agenda topics, I think you had too many presentations tonight. There clearly has to be more time for the public given an opportunity to speak. As far as the presentations, one of the items that came across my desk most recently was the dredging of contaminated sediment from Tannery Bay, St. Mary's River, Sault Ste. Marie, Michigan. It stopped for the weekend. Project will resume in the spring of 2007.

Removing the sediment will improve environmental conditions in the St. Mary's River. The clean up will be 40,000 cubic yards or 500,000 pounds of sediment contaminated with mercury and potassium.

Now I guess my concern is, how come they're cleaning up the St. Mary's River and we're still looking at sampling, we're looking at testing, we're looking at pilot studies, and it's been five years since this damn stuff has been discovered? Now I can't quite understand that. If you want to talk about future agenda issues, would you please consider actions that need to be taken to protect and restore the Tittabawassee River and floodplain and Saginaw River and Bay within a 3 year framework, not a 12 or 15 or 20 year framework, and precise goals and time lines for implementation and achievement of those, as well as what indicators will be used to measure performance, and what assessments will be undertaken to evaluate success or failure? I think it's time for some action. Less sampling, more action. If you want some fillers, if you want to give us some presentations, at least from an environmental perspective, and I suspect from the citizens who live in this area, we don't need to hear, with all respect, from Dr. Garabrant again. We heard from him and that

data is being evaluated by other sources and other people.

What we would like to hear are successful remediated sites. There are many successful remediated sites, not only in Michigan but in the United States. We need some examples of success to see what can be done in areas that have suffered the same defamation. As you probably know, there are some other areas, namely one in New Jersey, that's going on 12 years, same dioxin problem, not a bit of remediation has been done. We don't want to end up there, which is what I'm afraid we're moving towards. Five years and nothing has been remediated. Why in that first six miles of the Geomorph process weren't opportunities taken to remediate that river then and now? I asked it at that last meeting, didn't get a satisfactory answer. I ask it again. Why weren't remedial techniques used during that evaluation of those miles of that river?

CHUCK NELSON: Let these guys respond. Jim, do you have any response to that?

ART OSTASZEWSKI: I'd like to respond, Terry, at least initially. I was the Area of Concern Coordinator for the St. Mary's River in my previous position when I helped set up that remediation that's

going on right now. That site set dormant I think for at least 15 years after EPA -- their record of decision was to leave it in place, and it was some of our staff and MDEQ that forwarded it up through the Great Lakes Legacy Act Process, and that became a candidate site and I helped get that on the list, primarily because there was not a viable PRP to go after. In fact, the MDEQ had to put up the match monies of 35 percent to get that going, and Al will discuss that further with you from a St. Mary's perspective if you have additional questions.

AUDIENCE MEMBER: So an orphan fund perhaps may get remediated faster than one that we have a responsible party for?

ART OSTASZEWSKI: It is a criteria from a Legacy Act perspective. That's potentially why that site got pushed up.

CHUCK NELSON: Go ahead, sir.

AUDIENCE MEMBER: Just a quick question, in light of the U of M study, and if you look at the U of M study, you know, it's indisputable, scientific, statistical facts, the numbers that Dr. Garabrant gives us, and my question is, based upon what we're finding, and we're not hearing a bunch of susceptible to a risk, these are concrete facts, these are good

numbers, shouldn't we finally take a look at going around folks up and down the floodplain and moving soil around and cleaning their houses out of the dust? We're wasting a lot of money from what I see. Based upon from the U of M study, dust and soil is not a contributor, and doesn't it seem now that we should use a little bit of common sense and kind of quit doing these useless exercises? We're not accomplishing anything. Is anybody going to take a look at that now?

JIM SYGO: Well, the one comment I would have is that I don't think Dr. Garabrant even said they're not a contributor. He said they're a minor contributor. So there's still the issue that it's -- there is a contribution going on there. We are taking that information into consideration as we're moving through the RI workplan process right now. That information will be valuable information to determine what directions we're going to go in, and the human health risk assessments are in the process of being evaluated. So it's -- you know, the study is valuable from the standpoint of information that was developed by it and can be utilized, but it still isn't a study that deals with the regulatory framework that we have to deal with considering Dow's position as being

responsible for the correction actions and such.

AUDIENCE MEMBER: I'd like to thank Dr. Garabrant for his presentation and I look forward to any new information, sir, but I do have, having said that, a question about the kind of tests that you were conducting. I happen to be a CQE, Certified Quality Engineer, and I would like to see your AP test or your Kye score testing that was done. I'd also like to draw this analysis from just your presentation. I don't know the kinds of foods that your study, whether they were scrape foods or people that ate the foods, but I do know that when I go in my garden and I just wash them off with the nearest hose and I eat those foods, every once in a while I can feel the grind of the dirt that I inhaled or digested. Therefore, I'm particularly interested in the cognitive testing that you did in these areas to determine whether that, in fact, in a definitive way the soil levels of this contamination.

DR. GARABRANT: First off, on the statistics, in those tables from the progression models, when you look at them and you can pull them up on the web, what you'll see is the P values for each of those items. So that's the result of the statistical testing, and I'll have to have Brenda help

me out. The P values are tested. For each of those, if it's color pink or green, they are significantly different from zero. Some positive. Some negative. Okay. That's number one.

In terms of the foods, we asked people what foods they ate, okay, in other words the questionnaire interview asked people about foods they had eaten in the past. We did not test foods specifically. We didn't take samples of foods and test them. We tested blood, soil and household dust. We relied on people to tell us whether they ate fish and where it came from, whether they ate game and where it came from, whether they ate store boughten meat, eggs, et cetera. We did not actually test the dioxin content of any of the foods.

AUDIENCE MEMBER: All right. Then you see my point where you possibly could have some vegetables getting contaminated from the soil.

DR. GARABRANT: That certainly is possible, and if that soil contamination was an important contributor to the body burden of dioxins, I would have expected our analysis to have shown that, so in other words, if eating root vegetables from the area was an important predictor of the amount of dioxin in your blood, that's what our study was designed to

evaluate, and there's two possible reasons why it wasn't shown. The first is that it doesn't contribute. The second would be that people on average ate so little of that type of food that the study couldn't find it in the fat. I can't tell you.

AUDIENCE MEMBER: What was the null hypothesis?

DR. GARABRANT: Well, the null hypothesis is that there's no association so it's flat. We will look back at how many people said they ate say root vegetables from the Tittabawassee floodplain. In fact, I know we have that data. I've seen it. I can't recall it, how many ate root vegetables from Saginaw River floodplain, how many root vegetables from elsewhere, but I think it's safe to say at least what the data showed right now is that that's not -- eating root vegetables from the area is not associated with higher blood dioxin levels.

AUDIENCE MEMBER: You pointed out those 3.78 or 3 and 7/8ths that I saw in your chart.

DR. GARABRANT: Well, food as a group explains three or four percent of the variation in the blood TEQ, but when I say food as a group, that includes meat, fish, dairy, poultry, which tend to increase your levels, and fruits and vegetables which tend to

be associated with lower levels, so they do matter.

CHUCK NELSON: Gentlemen, can you do this one afterwards? Is there anyone else who has a comment here? Do you have a comment, sir?

AUDIENCE MEMBER: Yes. I'd like to know if someone from the MDCH could comment on the relevance of what the pilot exposure investigation used as a reference for background levels, I don't know whether it's Patterson or Peterson, as opposed to the U of M study that used NHANES? Was there any difference in those two studies? If U of M had used the PEI study, would their numbers have been different? And then a comment on their choice to use the median value on their charts and their brochures rather than charts and statistics that were used in the PEI study.

BETH: Well, the answer to the first question is, what did we use as our background comparison, and we used a study that was presented by some people from the Centers of Disease Control. Don Patterson was the primary author on that, and that was a compilation of data from I think four or six sites around the country where blood samples have been taken for dioxin analysis, and that was broken down by age group and so forth, so that was very useful to us. The NHANES data that U of M has used has been reported

by the National Center for Environmental Health as well, and in the NHANES report, which I think was available last July?

UNKNOWN SPEAKER: Electronically, it was earlier.

BETH: No. The data was available but the report was available in July, correct?

UNKNOWN SPEAKER: My memory is foggy but that's about it.

BETH: The NCEH chose not to present numbers for most of the cogeners and for the TEQ because the samples came back as nondetect, and it's hard to present an average value or median value when most of your data is nondetect. I'm not aware of where the U of M got the numbers that they're using. I'm assuming they downloaded the data themselves to run the analysis, but this is something that we've been told as something that we should do for comparative purposes. What is the second question?

AUDIENCE MEMBER: In the PEI study, you chose to use percentiles, and such, of ages and breakdown, et cetera, to demonstrate the impact. U of M chose just to use the median value.

BETH: We presented percentiles so we could compare to the numbers that were in the Patternson

study.

AUDIENCE MEMBER: Exactly.

BETH: And that's why we did it that way, for comparative purposes.

AUDIENCE MEMBER: And I guess the question I had asked at the last U of M presentation, would they consider using a similar reporting analogy so we could at least have an idea? You know, PEI study, U of M study, are they saying the same thing or are they totally off the wall? I'd like something that's common between the two to make a comparison.

BETH: That's something that Dr. Garabrant would have to address.

DR. GARABRANT: Beth, I may need you to refresh my memory a little bit on the NHANES data. There are a couple of issues. First off, we did use the information and we did download it from the Centers for Disease Control, the National Center for Environmental Health. One of the limitations of the NHANES data is that they didn't have as large amounts of blood as we had, so their limits of detection are somewhat higher. They cannot comment on very low levels because they couldn't measure it. We could, so we actually have better data.

Our comparisons -- this is where my memory fails

me, Beth -- they reported means within age ranges or specifically did they give the actual data?

BETH: The NHANES data set can be ranked by age range if you so desire, yes. It's just raw data that you download and manipulate.

DR. GARABRANT: Well, when you say manipulate, that's not the best word that you want to use.

BETH: Analyze or critique.

DR. GARABRANT: Okay. So you calculate the TEQ from the raw data which is available on their website.

BETH: Yes. There are 26 of 29 cogeners that they actually analyzed, yes.

DR. GARABRANT: So we had almost 29 cogeners, they had almost 26, which would make ours appear slightly higher. I know you did the calculations that that difference is contributing. We would be happy if you would like to have -- we reported medians. We could report percentiles if it's of use.

AUDIENCE MEMBER: I think it would be of use to the people who participated in the PEI study, because I mean, I'm one of them, and I'm just trying to see if there's any relevance to what you found to

what they have said, or else do I have two studies, one telling me one thing and another one totally on the opposite end of the spectrum, or are you both saying the same thing? I just want more information, you know, presenting your data in the way that they presented it in the PEI study.

DR. GARABRANT: Well, my recollection of the PEI study is it did give the distribution of the data from the CDC, and my recollection is that the participants in the PEI study had a range that completely overlapped with the CDC range, if I'm not mistaken, and you could easily right now go on our website and compare those two ranges, the range that was reported in the EPI study from the CBC, the participants, you could compare that to our range which is on the web right now, but we'd be happy to make a comparison if you want to know -- well, you can see where our 95th percentile cut rate is. You can see it on the website right now.

AUDIENCE MEMBER: I don't want to drag this into a technical discussion because I'm not qualified, but I do know that the data that the PEI compared was the Patterson study, so I can't compare what I -- you know, that 90th percentile out of that group of population is totally different than what you

presented in the NHANES. It's different data, isn't it, or different background, different samples?

DR. GARABRANT: Well, the Patterson data comes from four communities that are near Superfund sites that the CDC felt represented nonexposed populations. Okay. We've presented --

CHUCK NELSON: Gentlemen, it is 9:00. I want you to be able to continue your discussion but folks need to go. I do want to remind you the next meeting is on February the 8th, okay. I appreciate your attendance here tonight. I don't want to stop the two of you from talking, but many folks are putting on their coats. It's 9:00. I'm trying to keep on the schedule that we agreed to. Thank you for your attendance. See you at the next meeting.

(Meeting concluded at 9:00 p.m.)

STATE OF MICHIGAN)
)
COUNTY OF SAGINAW)

I certify that this transcript, consisting of 107 pages, is a complete, true, and correct transcript of the proceedings and testimony taken in this case on November 8th, 2006.

I also certify that I am not a relative or employee of or an attorney for a party; or a relative or employee of an attorney for a party; or financially interested in the action.

November 16, 2006

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Natalie A. Gilbert, CSR-4607, RPR

Notary Public, Saginaw County, MI

My Commission Expires: 8-10-2013